Management of temporal parameters of super-powerful laser pulses

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The report is devoted to the management of pulse duration and temporal intensity contrast ratio enhancement of laser pulses with petawatt power. The theoretical and experimental results of second harmonic generation process under strong influence of cubic nonlinearity will be discussed. The outcomes of implementation of small-scale self-focusing suppression method at intense laser beams ($1 \div 4 TW/cm^2$) will be considered.

WKB approach applied to 1D time-dependent nonlinear Hamiltonian oscillators

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We present a simple WKB-like approach to obtain approximate analytic solutions to a certain class of time-dependent nonlinear 1D Hamiltonian oscillators. The case of homogeneous power law potentials is solved explicitly in closed form in the leading order. The accuracy of the approximation is surprisingly good and we illustrate it in case of the quartic oscillator. The method is expected to be useful in treating the statistical properties of the dynamical quantities (like energy and adiabatic invariant) in nonlinear oscillators, and in many other applications in nonlinear oscillators.

References:

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Chaotic dynamics of generation of radiation by relativistic electron beams in photonic crystals

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We consider generation of radiation by relativistic electron beams in photonic (electromagnetic) crystals in conditions of Volume Free Electron Lasers (VFEL).